To Bromley Smith

ATLANTIC-PACIFIC INTEROCEANIC CANAL STUDY COMMISSION
1815 H STREET NW.
WASHINGTON, D.C. 20006

June 27, 1966 Bowdler

Mr. Bromley Smith
Office of the Special Assistant
for National Security Affairs
The White House
Washington, D. C.

Dear Bromley:

Attached is a draft of the Commission's second annual report. It has been approved in substance by the Commission and is now being circulated to State, ACDA, and the AEC for concurrence.

I plan to send it to the printer in final form on July 15 and give you whatever number of copies you need on July 30.

I would like to have approval or a redraft of the President's letter of transmittal before July 15. Call me if we can handle it by telephone (11 - 68481).

How many copies of the report will the White House need on July 30?

Sincerely,

John

Attachment

John P. Sheffey
Executive Secretary

LETTER OF SUBMITTAL

Washington, D. C.
July 31, 1966

Dear Mr. President:

We have the honor to submit herewith the second Annual Report of the Atlantic-Pacific Interoceanic Canal Study Commission as required by Public Law 88-609. This report covers the activities of the Commission through June 30, 1966.

Respectfully,

Atlantic-Pacific Interoceanic
Canal Study Commission
Robert G. Storey
Milton S. Eisenhower
Kenneth E. Fields
Raymond A. Hill
Robert B. Anderson, Chairman

The President
The White House
Washington, D. C.

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LETTER OF TRANSMITTAL

TO THE CONGRESS OF THE UNITED STATES:

By Public Law 88-609, I was authorized to appoint five men from private life to make a full study of the most suitable site for, and best means of constructing, a sea-level canal connecting the Atlantic and Pacific Oceans. On April 18, 1965, I appointed five distinguished American citizens to serve on the Atlantic-Pacific Interoceanic Canal Study Commission. They are: Robert B. Anderson, Chairman; Robert G. Storey, Vice-Chairman; Milton S. Eisenhower; Kenneth E. Fields; and Raymond A. Hill.

Under the terms of the authorizing legislation, the Commission is required to report to me on its progress for transmittal to the Congress on July 31 of each year and to make its final report not later than June 30, 1968. At the time of submission of its first report on July 31, 1965, the Commission had just initiated the planning phase of its investigation. It is now well into the execution phase, and engineering surveys have begun on the American Isthmus. The Commission's studies of the many other aspects of construction and operation of a sea-level canal are also underway in the fields of international relations, national defense, shipping, finance, and public information.

Public Law 88-609 recognized that the sea-level canal investigation would require at least three years. Unforeseen delays in obtaining survey rights have postponed the initiation of full-scale survey work on the canal routes until early 1967. The Commission does not now expect to be able to make a comprehensive report on June 30, 1968, as currently required in the authorizing legislation. In addition, the requirements of our forces in Vietnam have made it necessary for the Commission to provide itself some services that otherwise would have been provided by the Department of Defense. Both of these developments have added to the cost of the investigation. I expect to recommend legislation to the Congress at an early date amending Public Law 88-609 to permit some extension of the reporting date and to provide minimum essential additional appropriation authority.

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I take pleasure in submitting this second annual report to the Congress. In forwarding this report, I wish to emphasize the importance which I attach to the Canal Study Commission's investigation. The United States needs a modern canal through the American Isthmus. The Hemisphere needs it, and the world needs it. Its construction is an undertaking that would serve the true interests of all.

LYNDON B. JOHNSON

THE WHITE HOUSE

July 31, 1966

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ATLANTIC-PACIFIC INTEROCEANIC CANAL STUDY COMMISSION

SECOND ANNUAL REPORT

July 31, 1966

1815 H Street, N. W., Washington, D. C. 20006

SECOND ANNUAL REPORT

CONTENTS

Page

Letter of Transmittal i

Letter of Submittal iii

Section I Current Status of the Commission's Investigation 1

Section II International Relations 7

Section III Legislation 10

Section IV Budget and Fiscal Summary 11

APPENDICES

1. Organization and Staffing 1-1
2. Commission Activities 2-1
3. Study of Foreign Policy Considerations · 3-1
4. Study of National Defense Aspects . . . 4-1
5. Study of Canal Finance 5-1
6. Study of Interoceanic and Intercoastal Shipping 6-1
7. Study of Public Information 7-1
8. Study of Engineering Feasibility 8-1
9. Budget and Financial Program 9-1
10. Legislative Requirements 10-1
11. Site Survey Agreements 11-1
12. Map of Canal Routes 12-1

SECTION I

STATUS OF THE COMMISSION'S INVESTIGATION

JUNE 30, 1966

At the time of submission of its first annual report [redacted] the Atlantic-Pacific Interoceanic Canal Study Commission had been in existence only three months and had not completed its plan of investigation. In the 12 months since that date the Commission has determined the nature and extent of the studies it must undertake and has developed organizations, concepts and plans for their accomplishment. All of these studies are now underway.

During the past year the Commission has met monthly with the exception of February, April and May, 1966. In addition, individual Commissioners have had numerous meetings with representatives of agencies supporting the Commission, made visits to activities of interest to the Commission, and conducted Commission business at their home offices. In August 1965 the Commission visited Panama and conferred with the United States' Ambassador, the Governor of the Canal Zone and officials of the Government of Panama. It flew over the remote canal routes under investigation and inspected the principal installations of the existing canal.

In October 1965 the Vice Chairman of the Commission, Mr. Robert G. Storey, visited Colombia to discuss the Commission's investigation with the U. S. Ambassador and officials of the Government of Colombia.

In October 1965 the Commission visited the Nevada Operations Office of the Atomic Energy Commission and the Nevada Test Site where they were briefed on nuclear excavation experiments and inspected the craters produced by past experiments. The two members of the Commission with engineering backgrounds, Kenneth E. Fields and Raymond A. Hill, have made individual visits to Panama, to the Lawrence Radiation Laboratory, and to the Nevada Test Site of the Atomic Energy Commission.

Members of the Commission, its staff, and its agents have maintained close liaison with the appropriate committees of the Congress during the year to keep them informed of the progress of the investigation.

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The Commission has engaged a panel of eminent specialists in the fields of geology and soil mechanics to advise it on the conduct of its engineering study.

Throughout the year, in his other capacity as Special Representative of the United States for United States and Panama Relations, the Chairman of the Commission has kept the Commission informed of treaty matters affecting the Commission's investigation and has, in turn, been advised by the Commission.

The Commission's organization and staffing is contained in Appendix 1, and a detailed account of the Commission's activities during the year is contained in Appendix 2.

To provide itself a comprehensive foundation of factual data, estimates, and expert opinions upon which to base its ultimate findings and recommendations, the Commission is conducting six studies under its own direct supervision. The concepts of these studies and the organizations for their accomplishment are detailed in Appendices 3 through 8. The status of each study is as follows:

Study of Foreign Policy Considerations in the Construction and Operation of an Atlantic-Pacific Sea-level Canal

At the Commission's request, in October 1965 the Secretary of State provided leadership for an interdepartmental group to study and advise the Commission on the foreign policy interests in a new, sea-level canal. The membership of this group and an explanation of its study are contained in Appendix 3. The objective of this study effort is to:

a. Evaluate the effect of construction of a sea-level Isthmian canal on the U. S. relations with the countries where canal routes are under investigation and the countries that are significant users of the canal.

b. Evaluate the international relations aspects of nuclear canal excavation and to advise the Commission which method of construction, nuclear or conventional, best serves the international interests of the United States.

c. In cooperation with the study of interoceanic and intercoastal shipping and the study of canal finance, to advise the Commission on the method of financing and operating a sea-level canal that would best serve the United States' international interests.

The Study Group has completed a preliminary evaluation of the effect of the Limited Test Ban Treaty on the development of the nuclear excavation technology and analyzed the implications of the current treaty negotiations with the Republic of Panama. Their initial draft report is currently under review by the Commission. The major problems in international relations that bear on the Commission's investigation are outlined in Section II, below.

Study of National Defense Aspects of the Atlantic-Pacific Sea-level Canal

At the Commission's request, in October 1965, the Secretary of Defense provided leadership for an interdepartmental group to study the defense interests in a new, sea-level canal. The membership of this group and an explanation of its study are contained in Appendix 4. The objective of this study is to evaluate the effect of construction of an Atlantic-Pacific sea-level Isthmian canal on the national defense of the United States and to compare alternate routes and methods of construction from the standpoint of national defense.

The National Defense Study Group has completed a preliminary draft of its report. This draft is currently in the hands of the Commission for review and comment.

Study of Canal Finance

At the Commission's request, in October 1965, the Secretary of the Treasury provided leadership for an interdepartmental group to study methods of financing the construction and operation of a new, sea-level canal. The membership of this group and explanation of its study are contained in Appendix 5. The objective of this study is to develop the alternate methods available for financing the construction and operation of a sea-level canal; and, in cooperation with other studies directed by the Commission, to analyze the effects of each method.

The Finance Study Group has developed an initial analysis of the financial feasibility of the various canals under investigation by the Commission, using updated cost estimates from earlier studies, current toll rates, and a range of possible interest rates. This method of analysis is being adapted for accomplishment by computer. This will permit rapid incorporation of new variables and more accurate data as they develop during the investigation. The Finance Study will continue to advance in step with the other studies being conducted by the Commission as data are produced and policy decisions are made on matters affecting canal costs.

Study of Interoceanic and Intercoastal Shipping

At the Commission's request, in October 1965, the Secretary of Commerce provided leadership for an interdepartmental study group to study the interests of interoceanic and intercoastal shipping in a new, sea-level canal. The membership of this group and explanation of its study are contained in Appendix 6. The objectives of this study are to analyze the long-range trends of interoceanic and intercoastal shipping to the canal; to examine the interrelationship between the sea-level canal and shipping and finance; and, in cooperation with other studies, to analyze the effects of selected toll collection and distribution payments on interoceanic and intercoastal shipping. The preliminary phase of the Shipping Study has been completed, and draft chapters on Population, Economic Growth and Trade Expansion, and Innovation in Transportation and Equipment have been submitted to the Commission for review. Projections of canal traffic based upon this first phase are now in development.

Study of Public Information Aspects of Sea-level Canal Construction

The Commission staff is providing leadership for an interdepartmental group studying the public information aspects of the construction and operation of a new, sea-level canal. The membership of this group and explanation of its study are contained in Appendix 7. The objective of this study is to anticipate and evaluate the public reaction to each of the courses of action under consideration by the Commission and to weigh the influence of public opinion on the feasibility of each.

The Commission does not plan to conduct an extensive public information program. It is calling upon other government agencies for assistance as necessary through their own public information offices. The study of public information aspects of its investigation is designed to support its other studies, and detailed planning of it has awaited the completion of other study plans.

Inasmuch as the Commission is engaged in an impartial study, it is its policy that material issued in its name shall in no way favor one route or one method of canal construction over any other until such time as the investigation is complete and the Commission's recommendations are made public.

Study of Engineering Feasibility

A detailed Plan for Study of Engineering Feasibility has been developed by the Corps of Engineers, the Atomic Energy Commission and the Panama Canal Company, and the plan was approved by the Commission in September 1965. This plan is designed to make comparable studies of the feasibility of excavation of a sea-level interoceanic canal along several routes in Central and South America. For comparative purposes, the studies will include evaluation and updated cost estimates of existing plans to modernize the present canal and to construct new locks. As shown on Appendix 12, there are four general areas under consideration for a sea-level canal. These are:

a. A route generally along the Nicaragua-Costa Rica borders - Route 8.

b. Several alinements in and near the Panama Canal Zone - Routes 10-14.

c. A route in the Darien region of Panama - Route 17.

d. A route in extreme Northwest Colombia - Route 25.

The study effort includes a program of data collection, data evaluation and engineering studies. The funds which the Congress appropriated to support the studies in Fiscal Year 1966 were received in November 1965. Since that time, each agency has moved rapidly with its study effort. Pending receipt of survey agreements, the Engineering Agent proceeded with the purchase of long lead time equipment and materials. He has mobilized most of the necessary staff except those required for programs which are authorized but not active. The Agent is proceeding with studies that are not seriously affected by the weather or dependent upon access and real estate agreements that are not yet concluded. These studies include:

a. The Corps of Engineers has begun its study of the conversion of the existing lock canal to sea-level utilizing data being made available by the Panama Canal Company.

b. The joint high-level meteorology data collection program was initiated with the first rocket probe in March 1966 in the Canal Zone by the AEC and U. S. Army. The U. S. Air Force will join this effort in the near future.

c. Construction has started on base camps, supply stations and weather stations on the Darien Route in Panama (Route 17). These weather stations are expected to be operational by September 1966.

d. Limited topographical and geological surveys have been started along Route 17 and three of a planned total of 15 hydrologic stations have been installed.

e. Plans for full-scale data collection along both Route 17 and Route 25 are being made for execution beginning in the dry season of FY 1967 (December 1966).

A detailed summary of the Study of Engineering Feasibility is contained in Appendix 8.

SECTION II

INTERNATIONAL RELATIONS

There are three major areas of interest to the Commission in the field of international relations. The one that has required the earliest attention has been the negotiation of site-survey agreements in Panama and Colombia. The second is the search for a course for the United States to follow that will permit the development and use of the nuclear excavation technology. This involves both immediate problems of conducting the nuclear excavation experiments necessary to determine the technical feasibility of large scale earth moving by nuclear explosives and the longer term study of the political feasibility of nuclear excavation of a sea-level canal across the American Isthmus. The third is the evaluation of the local and world-wide political and economic effects that would derive from construction and operation of a sea-level canal on the various routes under investigation.

At the time of the hearings which led to the passage of Public Law 88-609 it was expected that the United States would negotiate treaties with the countries having promising canal routes. These treaties were to include United States authority to survey those routes as well as the terms under which a sea-level canal could be built and operated. The rate of progress in treaty negotiations with Panama led the Commission to recommend in September 1965 that site-survey rights be negotiated separately in order that surveys could begin without further delay. Discussions were undertaken immediately and an Exchange of Notes with the Government of Panama authorizing site surveys (Appendix 11) took place on February 15, 1966. Discussions continue with the Government of Colombia, and an agreement on survey rights is expected at an early date. In the negotiations both Governments have been friendly and cooperative but both have carefully avoided committing themselves beyond the basic rights to conduct the surveys.

The decision whether to request funds to survey the proposed canal route along the Nicaraguan-Costa Rican border has been deferred pending completion of maps of this route by the Inter-American Geodetic Survey. These maps are expected to be available in late 1966, at which time a preliminary engineering evaluation of the route will be made. The 140-mile length, much of which is at high average elevations and the complicated hydrography of the area appear to make this a costly route along which to construct a sea-level canal. The governments of both Nicaragua and Costa Rica have expressed willingness to cooperate with the United States in a survey of this route if preliminary study determines an on-site survey to be merited.

The Commission's plan for its long term study of foreign policy considerations in the construction and operation of a sea-level canal is explained in detail in Appendix 3. This study will consider the broad impact of possible sea-level canals on the host countries and on the United States and other countries with significant interest in an Isthmian canal. It will evaluate the foreign policy aspects of nuclear canal excavation, and it will include consideration of canal toll structures, finance plans, and methods of control.

As cited above, two major activities in the United States' international relations directly affect the conduct of this study. One with both immediate and long term effects is the United States' effort to maintain and reinforce international agreements for control of nuclear weapons and to prevent radioactive contamination of the world environment. As a signatory of the Treaty Banning Weapons Tests in the Atmosphere, in Outer Space and Under Water, the United States agreed to refrain from conducting nuclear explosions which cause "radioactive debris to be present outside the territorial limits of the state under whose jurisdiction or control such explosion is conducted." Thus, each nuclear cratering experiment must be carefully evaluated as to the amount of radioactivity that could escape the crater and, under various meteorological conditions, result in minor amounts of radioactivity being outside the boundaries of the United States. Technical developments in limiting the escape of radioactivity from peaceful nuclear explosions are most promising, and the Atomic Energy Commission is confident that it can conduct the necessary experiments without the release of harmful radioactivity. Because of the extreme care taken in the evaluation and approval of each experiment and the time required for development of each new experimental device, at present the total time required to establish the technical feasibility of nuclear canal excavation cannot be accurately estimated. There is a possibility that the larger experiments cannot be conducted without some form of international understanding with the principal signatories of the Nuclear Test Ban Treaty. The Commission, therefore, is working with the Secretary of State and the Chairman of the Atomic Energy Commission to determine what actions should be undertaken to permit the development and use of the nuclear excavation technology. The USSR is known to be interested in this technology, and many foreign countries have expressed interest in nuclear excavation projects in their own territory. As yet no negotiations on this subject have been undertaken with the Test Ban Treaty signatories.

Another current activity that affects the Commission's investigation is the negotiation now underway with the Republic of Panama for a new treaty for the continued operation of the existing lock canal, for a base rights agreement, and for a treaty for the construction and operation of a sea-level canal. The Commission's study is facilitated by the dual role of its Chairman who is also the Special Representative of the United States for United States and Panama Relations and for canal treaty negotiations. Formal negotiations for sea-level canal treaty rights with other canal site countries have not as yet been undertaken. The ultimate treaties will have a direct bearing on the evaluation of the canal routes under investigation, and the Commission is being kept informed of the progress of treaty negotiations by its Chairman.

SECTION III

LEGISLATION

The Commission's authorizing legislation, Public Law 88-609, was amended by Congress in June 1966. This amendment made funds appropriated for the investigation available without limitation as to fiscal year and provided the Commission with additional administrative authority.

Developments during the 15 months since the Commission's appointment led to the unavoidable conclusion that the reporting date of June 30, 1968, established by the Congress in P.L. 88-609, does not provide sufficient time for the Commission to accomplish its investigation as planned. The Commission is currently studying the alternatives and will submit recommendations for amending legislation early in calendar year 1967.

A detailed discussion of legislative requirements is contained in Appendix 10.

SECTION IV

BUDGET AND FISCAL SUMMARY

An appropriation of $7 million was made by Congress in FY 1966 for continuation of the study based on the assumption that full-scale data collection would begin along the Panamanian route in November 1965 and the Colombian route early in calendar year 1966.

Delays in obtaining survey agreements with both Panama and Colombia have delayed the Interoceanic Canal Study. The on-site survey along the Panamanian route actually began in late February 1966 following the concluding of the Survey Agreement and then only to a limited extent while detailed real estate needs were being negotiated. The survey in Colombia is expected to begin at the end of the present rainy season in January 1967. As a result of these late starts, $0.1 million remained unobligated in FY 1965 and approximately $2.0 million in FY 1966.

In order to carry on its work in Fiscal Year 1967, the Commission has requested $6.5 million. This will be made up of $4.4 million in new appropriations plus the $2.1 million, which was unobligated in FY 1965 and FY 1966. The Fiscal Year 1967 program includes full-scale data collection along both survey routes plus the continuation of the other studies.

The experience obtained in FY 1966 and FY 1967 will be used to develop a new program for completion of the study.

APPENDIX 1

ORGANIZATION AND STAFFING FOR ATLANTIC-PACIFIC INTEROCEANIC CANAL STUDY

BACKGROUND

On April 18, 1965, the President appointed the members of the Atlantic-Pacific Interoceanic Canal Study Commission in accordance with Public Law 88-609. This act, in addition to establishing the Commission's responsibilities, authorized the Commission to call upon other Departments and Agencies of the Executive Branch of the Federal Government to assist it in the conduct of its study. This they have done. They first addressed themselves to the engineering aspects of the study responsibility, since consideration of these would require the greatest effort and the longest period of time. To assist them with these engineering studies, which are tremendously detailed and highly technical, they called upon the U. S. Army Corps of Engineers, the Atomic Energy Commission, and the Panama Canal Company. Under the direction of the Commission these agencies are undertaking the studies of engineering feasibility, assisted, as necessary, by other governmental and non-governmental individuals and agencies.

At the Commission's request, the Secretary of the Army designated the Chief of Engineers to coordinate the engineering feasibility studies among these various agencies and the Chief of Engineers has appointed an Engineering Agent for this purpose. The Agent works closely with the Atomic Energy Commission, the Panama Canal Company, and others in coordinating this vitally important effort. The Commission has requested and obtained the assistance of the Department of the Treasury to provide leadership in studying the financial requirements and alternate means of financing of a sea-level canal. They have called upon the Department of Commerce to work in coordination with the Panama Canal Company, the Maritime Administration, the Navy, the Chief of Engineers and others, in a study of the interoceanic and intercoastal shipping needs and intercoastal commerce. The Secretary of State has agreed to provide the leadership in the study of the foreign policy aspects of sea-level canal construction and operation and the Secretary of Defense has, at Commission's request, undertaken a study of the defense aspects. In another area of Commission support, the Office of the Secretary of the Army and the Corps of Engineers are funishing extensive administrative services for the Commission.

ORGANIZATION FOR CANAL STUDIES

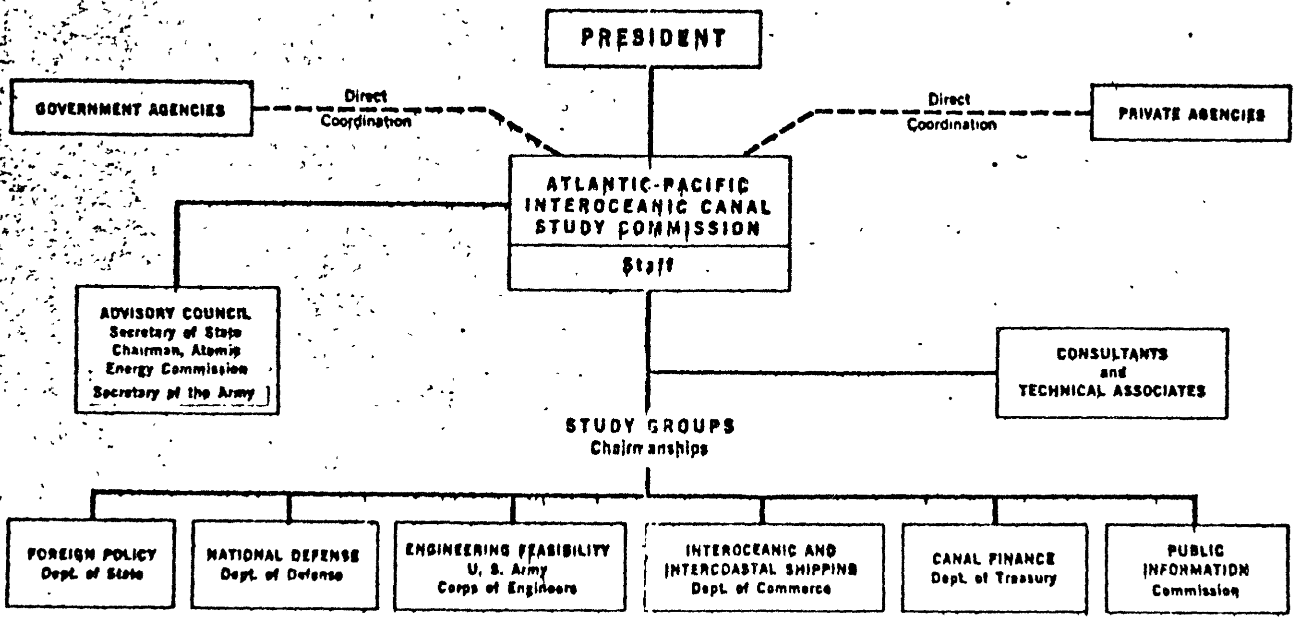

Figure 1-1

MAJOR PARTICIPATING AGENCIES

- ATLANTIC-PACIFIC INTEROCEANIC CANAL STUDY COMMISSION
- DEPARTMENT OF STATE
- DEPARTMENT OF TREASURY
- DEPARTMENT OF DEFENSE
- DEPARTMENT OF COMMERCE
- ATOMIC ENERGY COMMISSION
- PANAMA CANAL COMPANY
- DEPARTMENT OF THE ARMY
- DEPARTMENT OF THE NAVY
- DEPARTMENT OF THE AIR FORCE
- U. S. ARMS CONTROL AND DISARMAMENT AGENCY
- U. S. INFORMATION AGENCY
- ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION

THE COMMISSION

Robert B. Anderson of New York City, Chairman. Lawyer, businessman, public servant (Secretary of the Navy, Deputy Secretary of Defense, Secretary of the Treasury). Currently a partner of Carl M. Loeb, Rhoades & Co.

Robert G. Storey of Dallas, Texas, Vice-Chairman. Lawyer, businessman, college dean, public servant (Hoover Commission; State Department legal adviser in Korea, the Far East, and the Middle East; Fulbright Commission; Civil Rights Commission; Commission on Law Enforcement and Administration of Justice; etc.). Currently President, Southwestern Legal Foundation and partner, Storey, Armstrong and Steger.

Dr. Milton S. Eisenhower of Baltimore, Maryland. Educator and public servant (Department of Agriculture, U.S. Commission for UNESCO, Committee on Government Organization, Special Ambassador and Representative of the President for Latin American Affairs, National Commission for International Development, etc.). Currently President, Johns Hopkins University.

Kenneth E. Fields of Greenwich, Connecticut, Brig Gen (Ret.), Corps of Engineers, U.S. Army. Consultant, businessman (Director, U.S. Waterways Experiment Station; Staff Officer, Manhattan Project; General Manager, Atomic Energy Commission; Executive Vice-President, Bulova Watch Co. and International Standard Electric Corp.; consultant, General Dynamics Corp., etc.).

Raymond A. Hill of San Francisco, California. Civil engineer, consultant, water resources specialist (consultant on water supply project in Mexico, Haiti, Turkey, Greece, Iraq, Pakistan, UAR, New Zealand, Australia, State of California and other Southwestern states.) Currently a partner in Leeds, Hill and Jewett, Inc.

COMMISSION EXECUTIVES

Executive Secretary, John P. Sheffey

Engineering Agent, Brig. General Harry G. Woodbury, CE, U. S. Army

ADVISORY COUNCIL

Honorable Dean Rusk	Secretary of State
Dr. Glenn T. Seaborg	Chairman, Atomic Energy Commission
Honorable Stanely R. Resor	Secretary of the Army

TECHNICAL ASSOCIATES FOR SOILS AND GEOLOGY

Dr. Arthur Casagrande

Dr. Frank A. Nickell

Dr. Philip C. Rutledge

Mr. Roger Rhoades

Mr. Thomas F. Thompson

STUDY GROUPS

The staffing for each study group is included in the appropriate Appendix.

APPENDIX 2

SIGNIFICANT ACTIVITIES OF THE ATLANTIC-PACIFIC INTEROCEANIC CANAL STUDY COMMISSION
AUGUST 1, 1965 - JUNE 30, 1966

Regular Meetings

During the year the Commission, in formal session, has taken the following significant actions:

August 22, 1965:

Directed its Engineering Agent to enter into negotiations with eminent scientists and engineers to become technical associates of the Commission.

September 17-18, 1965:

Approved the Plan for Study of Engineering Feasibility.

Approved the Fiscal Year 1967 budget request for $6.5 million.

Directed the execution of a revised Fiscal Year 1966 program of engineering studies based upon the assumption that field work would begin on Routes 17 and 25 during the fiscal year.

Reviewed Plans of Study of Shipping and Canal Finance and issued additional guidance to the study group chairmen.

Approved plans for the Studies of Canal Defense and Foreign Policy Considerations presented by the chairmen of these study groups.

October 29-30, 1965:

Approved a Public Information Plan for the Commission itself and a Plan for Public Information Activities in connection with the study of engineering feasibility.

Requested the Department of State to secure site-survey agreements with Panama at the earliest practicable date.

Authorized the hiring of a Commission consultant on construction methods and costs.

Approved planning guidance for the conduct of the Engineering Feasibility Study.

November 18, 1965:

Approved an apportionment request of BoB for $7 million for Fiscal Year 1966 Commission activities.

Forwarded the Fiscal Year 1967 budget request of $6.5 million to the Bureau of the Budget.

Requested the Department of State to initiate discussions with the Government of Colombia for site-survey rights on Route 25.

December 16, 1965:

Approved an apportionment request to the Bureau of the Budget for $2.938 million for Commission activities in the third quarter of Fiscal Year 1965.

Approved an outline of the Study of Canal Finance presented by the chairman of the Finance Study Group.

Approved an outline of the Study of Interoceanic and Intercoastal Shipping presented by the Chairman of the Shipping Study Group.

Reviewed the seismic program of the Engineering Feasibility Study.

January 14, 1966:

Established a policy covering the employment and utilization of technical associates.

Reviewed with Chairman Glenn T. Seaborg of the Atomic Energy Commission that agency's program designed to determine the technical feasibility of nuclear canal excavation.

March 17, 1966:

Approved the Engineering Agent's revised operating program for Fiscal Year 1966 and apportionments for the third and fourth quarters.

Approved, for planning and current operations, the assumption that the Commission's investigation must be extended until June 30, 1969, and its authorized expenditures increased to $21.3 million.

Discussed the development of nuclear excavation technology with Dr. Donald F. Hornig, Special Assistant to the President for Science and Technology.

Met with the Secretaries of State, Treasury, Commerce and Army; the Deputy Secretary of Defense; the Chairman of the Atomic Energy Commission; and the Chairman of the Joint Chiefs of Staff to inform them of the progress of the Commission's investigation; its relationship to the Atomic Energy's PLOWSHARE Program; to discuss its problems; and to invite their attention to their agencies' parts in the investigation.

June 23, 1966:

(To be added)

Liaison with the Congress

On January 25, 1966 the Commission met with the House Committee on Merchant Marine and Fisheries to discuss the canal investigation. In March 1966 members of the Commission testified in support of the Commission's budget before the Subcommittee on Public Works of the Appropriations Committees of both houses of the Congress. During the year, the Chairman, members of the Commission, and its staff and agents have called upon many members of the Congress and Congressional committee staff members to keep them informed of the progress of the Commission's investigation.

Field Trips

August 18-22, 1965:

The Commission visited Panama and conferred with the Governor of the Canal Zone and with officials of the Government of Panama. It flew over the remote canal routes under investigation and inspected the principal installations of the existing canal and toured its entire length by water, rail and air.

September 7-10, 1965:

Commissioners Kenneth E. Fields and Raymond A. Hill visited the Nevada Operations Office of the AEC to review plans for the development of the nuclear excavation technology.

October 3-5, 1965:

Vice Chairman Robert G. Storey visited Colombia to discuss the Commission's investigation with the U.S. Ambassador and officials of the Government of Colombia.

October 19-28, 1965:

Commissioners Kenneth E. Fields and Raymond A. Hill visited the Canal Zone to discuss past canal studies with officials of the Panama Canal Company and review plans for the conversion of the existing lock canal to a sea-level canal.

October 29-30, 1965:

The Commission visited the Nevada Operations Office of the Atomic Energy Commission and the Nevada Test Site where they were briefed on the nuclear excavation experiments and inspected the craters produced by past experiments.

November 8-9, 1965:

Commissioner Kenneth E. Fields attended the AEC's PLOWSHARE Advisory Committee meeting in Las Vegas, Nevada.

March 1-2, 1966:

Commissioner Kenneth E. Fields visited the U.S. Army Engineer Nuclear Cratering Group and the Lawrence Radiation Laboratory at Livermore, California to discuss the development of the nuclear excavation technology.

March 19-25, 1966:

Commissioner Kenneth E. Fields visited Panama and the Canal Zone in the company of eminent geologists who have been engaged as technical associates of the Commission.

April 29, 1966:

Commissioner Raymond A. Hill visited the U. S. Army Engineer Nuclear Cratering Group and the Lawrence Radiation Laboratory at Livermore, California to discuss the development of the nuclear excavation technology.

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APPENDIX 3

STUDY OF FOREIGN POLICY CONSIDERATIONS IN THE CONSTRUCTION AND OPERATION OF AN ATLANTIC-PACIFIC SEA-LEVEL CANAL

Study Group Membership

The Study Group on Foreign Policy supporting the Atlantic-Pacific Interoceanic Canal Study Commission includes the following representatives:

Mr. Jerome F. Fried, Policy Planning Council, Department of State (Chairman)
Mr. John P. Sheffey, Executive Secretary, Atlantic-Pacific Interoceanic Canal Study Commission
Colonel Ernest Graves, Office, Deputy Under Secretary of the Army (IA)
Mr. Philip Franklin, Office of Transportation Policy, Department of Commerce
Mr. John S. Kelly, Director, Division of Peaceful Nuclear Explosives, U. S. Atomic Energy Commission
Mr. Francis A. Cooke, Central American and Panamanian Desk Officer, United States Information Agency
Mr. R. Duane Saunders, Director, Office of Debt Analysis, Department of the Treasury (Alternate - Mr. Edward P. Snyder)
Mr. Charles N. Van Doren, Deputy General Counsel, Office of the Director, Arms Control and Disarmament Agency, Department of State
Brigadier General Harry G. Woodbury, Engineering Agent, Atlantic-Pacific Interoceanic Canal Study Commission

Study Purpose

a. to evaluate the effect of the construction of a sea-level Isthmian canal on the United States relations with: (1) the countries directly affected by the gain or loss of a canal, and (2) the countries that are significant users of the canal; and

b. to advise the Commission whether U. S. foreign policy interests are best served by the construction of a sea-level canal by either conventional or nuclear methods, considering each route investigated; and

c. in cooperation with the Study Group on Interoceanic and Intercoastal Shipping and the Study Group on Canal Finance, to advise the Commission as to what method of financing and operating a sea-level canal would best serve U. S. foreign policy interests.

Study Content and Concept for Accomplishment

The interdepartmental Study Group on Foreign Policy proposes to examine all of the existing and foreseen issues in sea-level canal construction and operation that affect the international relations of the United States. The questions involved are complex, and the study is interrelated with the studies of Engineering Feasibility, Canal Defense, Canal Finance, Interoceanic and Intercoastal Shipping, and Public Information also being conducted in support of the Commission investigation.

Canal treaty negotiations with the Republic of Panama and with any other canal site countries that are completed during the course of the study will have great bearing on its findings.

The Study Group must carefully consider the immediate and long-term interactions of the United States' efforts to maintain and reinforce the Nuclear Weapons Test Ban Treaty and the development of the nuclear excavation technology and its possible use in canal excavation.

With the understanding that many portions of its own study will depend upon the findings of the five other Commission directed studies and upon the results of international negotiations on canal and nuclear test matters, the Foreign Policy Study Group is considering the following matters which will influence the United States canal policy:

A. History of the United States Isthmian Canal Policy.

B. Current Relations with Panama.

C. Current Relations with Colombia.

D. Current Relations with Nicaragua and Costa Rica.

E. Treaties and Agreement Affecting Construction and Operation of an Isthmian Canal.

F. U.S. Interests and Obligations Affecting an Isthmian Canal.

G. Implications of the Treaty Banning Nuclear Weapons Tests in the Atmosphere, in Outer Space, and Under Water.

H. Arms Control and Disarmament Activities.

I. International Cooperation in the Peaceful Uses of Nuclear Energy.

J. Advantages and Disadvantages of Nuclear Canal Excavation.

K. Advantages and Disadvantages of Conventional Canal Excavation.

L. Immediate and Long-Term Economic Impact of New Canal Canal Construction.

M. Comparison of Routes Under Consideration.

N. Foreign Policy Considerations in Canal Control, Finance, and Timing of Construction.

The Study Group is acquiring factual data and opinions on these matters from the agencies and individuals best qualified to provide such material. The Government agencies directly concerned are represented on the Study Group. Individuals in both public and private life will be consulted who are or have been concerned with the formulation of United States policies affecting the topics under study.

The Study Group will make appropriate use of past, current, and planned future studies of canal-related matters by U. S. Agencies, Foreign Governments, the United Nations, and private agencies. It plans to request Commission authority to contract for a study of the economic impact of various canals on the canal site countries, should available data prove inadequate.

The Study Group will compile portions of its study as data become available. It contemplates submitting annual drafts to the Commission, revising and adding to them as necessitated by new developments that affect Foreign Policy considerations. Inasmuch as the Foreign Policy Study will deal with matters still in negotiation and government decisions yet to be made, study drafts will be classified and will be available only to those individuals with proper security clearances and a legitimate need for access to them.

Study Status June 30, 1966

The Foreign Policy Study Group was organized under the chairmanship of a representative of the Department of State in October 1965. In the following months the group developed and submitted a proposed study outline, which the Commission approved for planning purposes. It is understood that the Commission will issue additional guidance from time to time as its investigation proceeds. On June 1, 1966, the Study Group submitted to the Commission an initial draft of those portions of its study dealing with the background of the U.S. Isthmian Canal Policy, the current situation in Panama, and the implications of U. S. policy on international limitations on the testing of nuclear explosives. The Study Group is currently continuing the development of other portions of its study.

APPENDIX 4

STUDY OF NATIONAL DEFENSE ASPECTS OF AN ATLANTIC-PACIFIC SEA-LEVEL CANAL

Study Group Membership

Mr. Thaddeus Holt, Deputy Under Secretary of the Army (IA) (Chairman)
Colonel Ernest Graves, Office, Deputy Under Secretary of the Army (IA) (Secretary)
Mr. Frederick D. Sharp, Officer-in-Charge, Politico-Military Affairs, Bureau of Inter-American Affairs, Department of State
Brigadier General Edwin F. Black, Director of Western Hemisphere Region, Office, Assistant Secretary of Defense (ISA)
Captain William M. Carpenter, USN, Office, Director of Western Hemisphere Region, Office, Assistant Secretary of Defense (ISA) (Alternate)
Colonel Roger Ray, Office, Assistant to the Secretary of Defense (Atomic Energy)
Lt. Colonel J. D. Balmer, Jr., Western Hemisphere Division, Office of the Director J-5 (Plans & Policy), Office, Joint Chiefs of Staff
Colonel Norman E. Pehrson, Assistant Chief, International Policy Division, Office, Deputy Chief of Staff for Military Operations, Department of the Army
Major James H. Shaha, International Policy Division, Office, Deputy Chief of Staff for Military Operations (Alternate)
Commander Charles D. Hinds, Strategic Plans Division, Office, Deputy Chief of Naval Operations (Plans & Policy), Department of the Navy
Lt. Colonel Louis M. McAdory, Western Hemisphere Branch, International Affairs Division, Office, Deputy Chief of Staff, Plans & Operations (AFXPDO), Department of the Air Force
Mr. John S. Kelly, Director, Division of Peaceful Nuclear Explosives, Atomic Energy Commission
Mr. William L. Oakley, Division of Peaceful Nuclear Explosives, Atomic Energy Commission (Alternate)
Mr. Philip E. Franklin, Office of Transportation Policy, Department of Commerce
Mr. John P. Sheffey, Executive Secretary, Atlantic-Pacific Interoceanic Canal Study Commission
Colonel John A. Hughes, Deputy Engineering Agent, Atlantic-Pacific Interoceanic Canal Study Commission (Engineering Agent Representative)

Study Purpose

To determine the effect of construction of an Atlantic-Pacific sea-level Isthmian canal on the national defense of the United States and to compare alternate routes and methods of construction from the standpoint of national defense.

Study Content and Concept for Accomplishment

The study analyzes the effect of construction of a sea-level canal on the national defense in four respects. First is the effect on the contribution which transit of ships through an Atlantic-Pacific interoceanic canal makes to the strategic mobility of naval forces and to ocean-borne logistic support of United States forces deployed overseas. Second is the effect on vulnerability and defense of the interoceanic waterway. Third is the effect on the collective security arrangements for the Western Hemisphere which are associated with the defense installations of the canal. Finally, there are the possible indirect effects of the choice of method of construction on the national defense, as distinct from the direct effects which this choice has on the aspects already considered above. The analysis leads to findings and conclusions as to the net over-all effect on the national defense and the relative effect of the alternate routes and methods of construction. Of necessity, the study is classified.

The Department of the Army, on behalf of the Department of Defense, has undertaken responsibility for preparation of the National Defense Study. The study effort is being shared by representatives on the Study Group from the Departments of the Army, the Navy, and the Air Force, the Office of the Assistant Secretary of Defense for International Security Affairs, the Joint Chiefs of Staff, the Department of State, the Department of Commerce, the Atomic Energy Commission, and the Atlantic-Pacific Interoceanic Canal Study Commission. Various members of the Study Group have prepared initial drafts of portions of the study, which have then been reviewed by the entire Group. Successive revision and extension of the study have been undertaken based on comments of all the Study Group members. The study program contemplates continuation of this approach as the study report is reviewed at successively higher levels within the Department of Defense.

Study Status - June 30, 1966

The National Defense Study Group has completed an initial draft of its report and submitted the draft to the Commission for review and comment.

APPENDIX 5

STUDY OF CANAL FINANCE

Study Group Membership

The Study Group on Canal Finance supporting the Atlantic-Pacific Interoceanic Canal Study Commission includes the following representatives:

Mr. R. Duane Saunders, Director, Office of Debt Analysis, Department of the Treasury (Chairman)

Brigadier General Harry G. Woodbury, Engineering Agent, Atlantic-Pacific Interoceanic Canal Study Commission

Mr. John P. Sheffey, Executive Secretary, Atlantic-Pacific Interoceanic Canal Study Commission

Mr. Philip Franklin, Office of Transportation Policy, Department of Commerce

Mr. Michael Ely, Office, Division of Financial Operations, Department of State

Mr. Merrill Whitman, Secretary, Panama Canal Company

Colonel Ernest Graves, Office, Deputy Under Secretary of the Army (IA)

Study Purpose

To determine for the Commission the methods available for financing the construction and operation of a sea-level canal; and, in cooperation with other agencies and the Commission, to analyze the effects of each method. In the ultimate sense, the purpose of the Canal Finance Study is to provide an analysis of the relative economic costs and benefits of alternative canal proposals, so that the Commission can give appropriate weight to the economic aspects of the various alternatives in arriving at its final recommendation. The narrower objective is to develop a feasible plan for the financing of the recommended alternative.

Study Content and Concept for Accomplishment

The Canal Finance Study Group proposes to examine all of the issues which may bear on the financial arrangements made for the proposed new canal. This study will not, however, extend to such questions as the effects of the new canal on the economies of the host country or other countries, nor to foreign relations considerations or costs, excapt as they may involve directly related payments to the host country or other countries. The Canal Finance Study Group also does not propose to consider the national defense cost-effectiveness or other national defense aspects of the proposed new canal, except as national defense requirements may result in additional capital or operating costs charged to the canal.

Final determination of feasible financing alternatives for the proposed new canal will have to await the final results of investigations by the Shipping, Engineering Feasibility, National Defense, and Foreign Policy Study Groups. The essential inputs to the financial study are the over-all project costs and revenues and, in particular, the time patterns involved, the extent to which costs are chargeable against revenues, and the terms on which various types of financing may be available. Thus, the estimated capital costs and the timing of the capital outlays may be dependent upon the results of the engineering feasibility studies and policy decisions regarding conventional or nuclear construction. Certain capital and operating costs; e.g., these related to special defense requirements, may not be chargeable against revenues. On the other hand, canal revenues may be subject to fixed or variable charges not related to the direct costs of construction or operation of the canal; e.g., payments to the host country. Revenues, in turn, may depend upon estimates of demands for canal services and the pricing policies adopted. In addition, the assumption of various interest or equity rates of return may be necessary depending upon the sources of financing considered available.

Since the choices open to the other study groups may be limited in part by their financial feasibility, tentative financial planning will be needed at an early stage. The Canal Finance Study Group, therefore, has initiated its studies by preparing, on the basis of various cost and revenue assumptions, a range of illustrative financial plans for the preliminary use of the other study groups and the Commission. These illustrative plans will then be revised and refined by the Canal Finance Study Group in the light of the findings and conclusions developed by the other study groups or by the Commission. Since the development of a final financial plan or plans, will, in a sense, bring the findings of the other study groups to a common focus, by summarizing the financial feasibility of the project, this step in the work of the Canal Finance Study Group cannot be completed until final settlement has been made of all of the relevant issues being considered by the Commission and the other study groups.

The study topics are listed below in descending order of the generality insofar as they influence the shape of the financial plan. This is not necessarily the same order in which they will be considered by the Canal Finance Study Group.

A. Is it possible to finance a sea-level canal through tolls?

1. Is self-support possible?

2. Form of any needed subsidy.

B. What sources of finance are feasible?

1. Wholly U. S. financed.

2. Shared financing.

3. Protection of U. S. interests.

C. What are the alternative methods of financing a sea-level canal?

1. Bond financing.

2. Equity financing.

3. Grants-in-aid.

D. Priority of payments on capitalization.

E. What related costs and benefits should be included in the analysis?

1. Payments to host country.

2. Payments on existing U. S. canal investment.

3. National defense features.

4. Foreign assistance, etc.

F. Residual interests.

1. Net current earnings.

2. After payment of returnable capital.

G. Construction and operating costs

1. Variations.

2. What is included.

Allowance for [illegible].

4. Timing of outlays.

H. Net revenues available.

1. Variations in tolls structure.

2. Secular growth of revenues.

I. Financial plan.

1. Variations in planning stage.

2. Variations after major policy and cost decisions are made.

Study Status June 30, 1966

The Canal Finance Study Group was organized in late 1965 and after preliminary discussions the group submitted a proposed study outline which was accepted by the Commission as a planning basis. Early in 1966 a preliminary financial analysis was submitted to the Commission by the Chairman of the Finance Study Group and subsequently reviewed by the study group. This analysis was based on currently available estimates of capital expenditures, operating costs and toll revenues on four alternative route proposals; i.e., continued operation of present canal, two nuclear construction sea-level canals, and a sea-level canal in the present zone. The cost ranges ran from $750 million to $2.2 billion. A set of completion dates from 1980 to the year 2000 and discount rates ranging from 4 to 12% were used in evaluating the net present value of the alternatives. More refined and up-to-date data were supplied by the various participants and a second preliminary financial analysis of the alternative proposals was prepared in June 1966. This was submitted to the Commission and the Finance Study Group will be meeting on this second financial analysis at an early date.

The basic question which the preliminary financial analyses sought to answer was whether from a financial and economic point of view it was advantageous to undertake any of the alternative proposals. Since costs are incurred over a period of years and revenues are also realized over a period of years they must be placed on a common basis for comparative purposes. This can be done by discounting future costs and earnings to a current date using an appropriate interest rate for this purpose. In the preliminary exercises no attempt was made to select the most appropriate interest rate and a wide range of rates was used. When a determination can be made as to an appropriate interest rate or rates consideration can then be given to the question of the sources of financing.

APPENDIX 6

STUDY OF INTEROCEANIC AND INTERCOASTAL SHIPPING

Study Group Membership

Mr. M. Cecil Mackey, Director, Office of Transportation Policy, Department of Commerce (Chairman)

Mr. Philip E. Franklin, Office of Transportation Policy, Department of Commerce (Assistant)

Brigadier General Harry G. Woodbury, Engineering Agent, Atlantic-Pacific Interoceanic Canal Study Commission

Mr. John P. Sheffey, Executive Secretary, Atlantic-Pacific Interoceanic Canal Study Commission

Mr. R. Duane Saunders, Director, Office of Debt Analysis, Department of the Treasury

Mr. Carroll Perry, Advisor, Office of Maritime Affairs, Department of State

Colonel Ernest Graves, Office, Deputy Under Secretary of the Army (IA) (Department of Defense representative)

Mr. Merrill Whitman, Secretary, Panama Canal Company

Study Purpose

To analyze for the Commission the long-range (through the year 2040) trends in intercoastal and interoceanic shipping related to the canal; to examine the interrelationships between the sea-level canal and shipping and finance; and, in cooperation with other agencies and the Commission, to analyze the effects of selected toll collection and distribution plans upon interoceanic and intercoastal shipping.

Study Content and Concept for Accomplishment

For the projection period of 1970 to 2040, the study will interpret the effect of the growth of population, income, and trade upon the utilization of the sea-level canal. The potential impact of innovation in transportation equipment and systems will similarly be considered. From an analysis of these projections, an estimate of the future demand for the canal will be made. This estimate in turn will provide a partial basis for determining the level and structure of tolls for the sea-level canal.

In the preliminary phase, the Commerce Department's Census Bureau, Business and Defense Services Administration (BDSA), Office of Business Economics (OBE), Bureau of International Commerce (BIC), and Maritime

Administration (MarAd) are carrying out assigned aspects of the study under the direction of the Office of the Under Secretary for Transportation (OUST). Specifically, the Census Bureau is making four population projections for the world (by region) and for the United States upon the basis of varying assumptions. BDSA and OBE are using these population figures to forecast economic development by regions for the world and by economic sectors for the United States. BIC and MarAd are employing these growth projections to estimate the future volume, composition and direction of world and United States commerce which would use an interoceanic canal. OUST and MarAd are also studying the possible future impact of innovation in transportation systems and equipment upon the utilization of a sea-level canal. Particular attention is being focused upon the size and operating characteristics of proposed ships and upon the future role of aircraft in the movement of general cargo.

From all of these inputs, OUST plans to develop a projection of the future utilization of a sea-level canal. In conjunction with the Finance Study Group, the level and structure of potential tolls will then be analyzed.

After the completion of this preliminary phase, plans for the preparation of the final report will be formulated. These plans will identify those areas needing more intensive study as well as any new areas calling for exploration. In developing these plans, the Office of the Under Secretary for Transportation will give consideration to the commentary of the members of the Shipping Study Group and departmental contributors and will be guided by the Commission.

A draft of the final report is expected to be completed six months prior to the submission date set by the Commission to permit an intensive review of the report's findings.

Study Status - June 30, 1966

The preliminary phase of the Shipping Study has been completed, and draft chapters on Population, Economic Growth and Trade Expansion, and Innovation in Transportation Systems and Equipment have been submitted to the Commission for review. The second and final phase of the study is now in development.

APPENDIX 7

STUDY OF PUBLIC INFORMATION ASPECTS OF SEA-LEVEL CANAL CONSTRUCTION

Study Group Membership

The Study Group on Public Information supporting the Atlantic-Pacific Interoceanic Canal Study Commission includes the following membership:

Mr. John P. Sheffey, Executive Secretary, Atlantic-Pacific Interoceanic Canal Study Commission (Chairman)
Mr. Locke Mouton, Technical Liaison Office, Office, Chief of Engineers
Mr. Thomas Dillon, Director, Policy Plans and Guidance Staff, Department of State
Mr. C. Owen Smith, Special Assistant to the Secretary of the Army
Mr. Francis A. Cooke, Central American and Panamanian Desk Officer, United States Information Agency
Mr. Philip Franklin, Office of Transportation Policy, Department of Commerce
Mr. John Kelly, Director, Division of Peaceful Nuclear Explosives, U. S. Atomic Energy Commission
Mr. Phillippe G. Jacques, Director, Division of Public Information, U. S. Atomic Energy Commission

Study Purpose

a. to anticipate and evaluate the public reaction to each of the courses of action under consideration by the Commission, to weigh the influence of public opinion on the feasibility of each, and to develop an appropriate program of public information activities for inclusion among the Commission's recommendations to the President; and

b. to provide advice on request for the on-going public information programs of the agencies supporting the Commission and to advise the Commission of additional actions needed to contribute to public confidence in the thoroughness and objectivity of the Commission's investigation.

Study Content and Concept for Accomplishment

During the conduct of the Commission's investigation the inter-departmental Study Group on Public Information is acting as an advisory group to the Commission. The Commission does not plan to conduct an extensive public information program under its own aegis. Under its general authority in Public Law 88-609 to call upon any agency of the Executive Branch for assistance, the Commission is obtaining support in public information matters from existing government agencies. It has issued the following policy guidelines.

a. the Commission desires a moderate public information program sufficient to explain its actions and gain public acceptance of its mission.

b. all requests for unclassified information are to be answered fully and promptly whenever possible.

c. since the Commission is engaged in an impartial study of facts, public information material issued in its name must in no way favor one route, or method of canal construction, over any other until such time as its ultimate recommendations are made public.

d. all Commission public information activities will be centrally controlled by its Executive Director. The Chairman may authorize delegation of those public information functions and responsibilities as conditions and the Commission's mission warrant.

e. in foreign countries where site-surveys may be in progress, the U.S. Ambassador will conduct relevant public information activities through United States Information Service.

Working through the Department of State, the Atomic Energy Commission, the United States Information Agency, and other appropriate government agencies in the U.S. and overseas, the study group will accumulate information on public attitudes toward the selection of various canal routes and methods of construction. From the best qualified sources available it will determine the feasible actions that would contribute to the public acceptability of each possible course of action under consideration by the Commission.

The Study Group does not plan to conduct public opinion polls or public education programs. It will acquire data, opinions and recommendations from public sources and from responsible officials, using existing inter and intra-government channels.

Study Status - June 30, 1966

The Commission's study of the public information aspects of its investigation is designed to support its other studies, hence its detailed planning has awaited the completion of other study plans. As of July 31, 1966 the Study Group has determined and the Commission had approved the specific questions to be answered by the study. Currently, the group is developing a detailed outline and a plan for the accomplishment of the study.

APPENDIX 8

STUDY OF ENGINEERING FEASIBILITY FOR ATLANTIC-PACIFIC INTEROCEANIC CANAL STUDY

ORGANIZATION AND STAFFING

1. Organization for Study

The Study of Engineering Feasibility is being coordinated by an Engineering Agent, within the Office of the Chief of Engineers, U. S. Army. To assist him in the exercise of this coordinating authority, a Canal Studies Coordinating Committee, composed of representatives of the major participating field agencies, has been formed to make such analyses and forward such recommendations as are considered necessary to the efficient pursuit of the studies.

2. Major Participating Field Agencies

The major participating field agencies and their respective major functions are:

A. U. S. Army Engineer Division, South Atlantic (SAD) provides direction and support to Jacksonville District for those activities concerned with data collection, evaluation, and economic studies. Direction and review by South Atlantic Division includes all aspects of the Engineering Feasibility Study, except those which concern nuclear engineering and nuclear operational studies.

B. U. S. Army Engineer District, Jacksonville (JAX) has primary field responsibility for:

(1) Prepare preliminary designs and cost estimates associated with conversion of the present Panama Canal to sea-level, using data provided by the Panama Canal Company.

(2) Prepare, in coordination with the Atomic Energy Commission, preliminary designs and cost estimates for the conventional construction associated with nuclear construction of two alternate canals.

(3) Conduct navigation studies and prepare a benefit-cost study of the three canal routes.

(4) Direct the data collection activities of the Office for Interoceanic Canal Studies.

(5) Direct those activities of the U. S. Army Corps of Engineers Nuclear Cratering Group associated with nuclear design of the alternate canals.

(6) Prepare and reproduce, in coordination with the Atomic Energy Commission and other participating agencies, the final report of engineering feasibility and such interim reports as the Commission may require.

C. The U. S. Army Engineer Nuclear Cratering Group will, under the direction of the District Engineer, Jacksonville, prepare the nuclear crater design for the nuclear-excavated canals.

D. The Office for Interoceanic Canal Studies, U. S. Army Corps of Engineers will, under direction of District Engineer, Jacksonville, manage and coordinate the on-site survey program of data collection, except technical direction of Atomic Energy Commission activities. In performance of his mission, the Field Director, Office for Interoceanic Canal Studies, will:

(1) Accomplish detailed planning of data collection in topography, hydrography, geology, hydrology, and natural resources to satisfy data requirements of data evaluation agencies.

(2) Supervise and coordinate data collection operations in the field.

(3) Plan, supervise, and coordinate logistical support.

(4) Manage and control funds for Corps of Engineers data collection and logistical support of all field programs.

(5) Utilize all available support from staff elements of the Panama Canal Company.

(6) Establish liaison with all U. S. governmental agencies in the host countries and act as point of contact between those agencies and all Corps of Engineer Agencies engaged in the Engineering Feasibility Study.

E. U. S. Atomic Energy Commission, Nevada Operations Office (NVOO) is responsible for planning and execution of a program of nuclear operations studies which will enable the AEC to state the safety implications of the proposed nuclear excavations. NVOO will obtain the services of qualified scientists to staff these working groups, especially from the Lawrence Radiation Laboratory and the Sandia Corporation.

F. Panama Canal Company (PCC) is providing all available data on the existing canal zone and vicinity, including data from and results of prior studies. In addition, PCC is providing personnel to staff the OICS and is providing major logistical support for the field operations of the data collection programs.

G. The Office, Secretary of the Army, is providing direct administrative support to the Commission members and to the staff of the Commission.

3. Canal Studies Coordinating Committee (CSCC)

A. The CSCC is the primary instrument to coordinate the activities of field agencies on the study of engineering feasibility.

B. The membership of the CSCC is as follows:

District Engineer, U. S. Army Engineer District, Jacksonville - Chairman

Manager, AEC Nevada Operations Office - Vice Chairman

Director, U. S. Army Engineer Nuclear Cratering Group - Member

Field Director, U. S. Army Engineer, Office of Interoceanic Canal Studies - Member

Representative, Panama Canal Company - Member

Chairman, Acoustic Waves Group (Sandia Corporation) - Member

Chairman, Ground Shock Group, Lawrence Radiation Laboratory - Member

Chairman, Radioactivity Group, Lawrence Radiation Laboratory - Member

Chairman, Cratering Characteristics Group, Lawrence Radiation Laboratory - Member

Chief, Interoceanic Canal Studies Branch, U. S. Army Engineer District, Jacksonville - Member

PURPOSE OF STUDY

1. General

The purpose of the Study of Engineering Feasibility is to make comparable studies of the feasibility of excavation of a sea-level interoceanic canal along several routes in Central or South America (see Appendix 12). The information developed in this study will be one factor considered in the deliberations of the Canal Study Commission in preparing recommendations to the President concerning where and by what means on interoceanic canal should be excavated.

2. Questions to be Answered

A. Considering the size and characteristics of military and commercial vessels and the frequency of transits of a sea-level canal through the year 2040, and further; considering the construction costs involved; what should be the limiting dimensions and alinements of a sea-level canal?

B. Considering radiological, acoustical and seismic effects; and, considering the technical and engineering problems associated with nuclear explosives and the terrain to be encountered; is it technically feasible to construct a sea-level canal using nuclear excavation?

C. What are the design features of a sea-level canal at the several locations?

D. What operating and maintenance facilities are required and what are the plans for operation and maintenance?

E. What equipment is to be used during construction and what is the construction plan and construction schedule?

F. How many personnel are required and how should they be organized to construct, operate, and maintain a sea-level canal?

G. What facilities are required and what procedures should be followed in providing for the evacuation of inhabitants within the zone of construction?

H. What medical, biological, and sociological problems would be encountered during construction and what procedures should be used to alleviate these problems?

I. Considering all of the above, what would be the construction, operating, and maintenance costs of a sea-level canal at the several locations?

J. From an evaluation of all engineering matters, what is the recommended location for a sea-level canal?

K. What is the possibility of meeting future traffic demands through modernization of the present lock canal?

3. Alternatives

The Study of Engineering Feasibility is presented with the following alternatives for consideration.

A. Meeting traffic demands by modernizing the existing canal.

B. Excavating a canal only by conventional methods.

C. Excavating a canal only by nuclear excavation and performing conventional clean-up.

D. Excavating a canal by a combination of nuclear and conventional methods.

SCOPE OF STUDY

1. Routes to be Studied

As shown on Appendix 12, there are four general areas under consideration. These are:

A. Route 8 - Generally along the border between Nicaragua and Costa Rica. A conceptual evaluation of Route 8 will be made to determine whether further examination is warranted.

B. The Canal Zone Area - Several alinements in and near the Panama Canal Zone are being studied to determine their feasibility for conventional excavation on a basis comparable to that upon which Route 17 and 25 will be studied. In addition, the possibility of meeting future traffic demands through modernization of the lock canal will be investigated.

C. Route 17 - In the Darien region of Panama. This route will be examined from the point of view of predominantly nuclear excavation, with such supporting or remedial conventional work as would be necessary. Figure 8-2 shows a portion of this route which is predominantly in a trackless jungle.

D. Route 25 - In extreme Northwest Colombia. This route will be studied on the basis of nuclear excavation through the Continental Divide area and foothills on either side, amounting to perhaps 50% of the route, and the remaining 50% being excavated by conventional methods.

2. Study Programs

A. Data Collection - A two-year program of field operations on the proposed routes will be undertaken to collect those data necessary to evaluate the physical engineering problems, the nuclear operations and safety problems, and the hazards to health which would be encountered in excavation of sea-level canals in remote areas of Colombia and Panama. Preliminary studies using the limited information available have indicated the nature and extent of the field data collection activities, which fall into two broad categories--basic engineering data and operational data. A third category of activities is the provision of necessary management and support.

(1) Basic Engineering Data: These data are to be collected to allow preliminary studies of feasibility for nuclear excavation design, necessary associated conventional earthwork, and other necessary conventional excavation where nuclear work is determined to be not economical. Types and quantities of data will be collected to provide the feasibility design and allow selection of the most economical channel alinement considering both the cost of construction and the cost of maintenance. The areas of collection include topography, geology, hydrology and hydrography.

(2) Operational Data: These data are required to assess the impact of using nuclear excavation techniques in the specific locations of the proposed routes for nuclear excavation, to establish limits on sizes of explosions allowable, define exclusion areas during nuclear excavation operations, and to define dangers to health and preventive medicine measures appropriate to the area. The studies fall within the five areas of meteorology, bioenvironmental factors, acoustic wave, seismology, and medico-ecology.

(3) Management and Support of Data Collection: This feature includes operation of a management and logistical support services center in the Canal Zone; provision of transportation to and from the areas of field operations; construction and operation of a base camp, weather stations, stream gaging stations, and supply points on each route; clearing and maintaining rough haul roads; preparing landing areas for water and aircraft; and providing resupply, communications and medical support for data collection teams. This support requires purchase of heavy equipment and materials in some cases, such as for maintenance of roads, and rental of equipment for other needs, such as initial clearing and camp construction. Considerable aircraft support is required due to the rugged terrain and lack of trails or roads, combined with the need to cover extensive areas in a restricted time.

B. Data Evaluation and Engineering Studies - In order to meet the requirements of the authorizing legislation, it will be necessary to make preliminary designs for each of the alternate sea-level canal routes in sufficient detail that a meaningful comparison can be made. These designs and associated cost estimates will consider initial costs and continuing annual costs projected through the useful life of the project, and will be based on data essentially in existence for study of modernization of the present lock canal, for conversion of the present canal, and on data to be collected during field operations on the proposed nuclear routes. The Data Evaluation and Engineering Studies can be grouped into the three categories of: nuclear excavation studies, operational studies, and engineering studies.

3. Timing

A. Collection - Studies of climatic conditions throughout the year in the Isthmian area show that there are distinct dry seasons in the Route 17 area but are not as distinct in the Route 25 area. The plans for major field activity on Route 17 are therefore grouped insofar as possible in the normal dry seasons of FY 1967 and FY 1968. The programs which require long periods of continuous data must of course operate throughout the year. Major field activities on Route 25 are planned for the same periods as those for Route 17, to take advantage of transportation and other support features.

B. Evaluation and engineering studies have started and will continue and progress as field data are made available.

4. Operational Constraints

A. Prior to conducting operations on the territory or within the territorial waters of a sovereign nation it is necessary to conclude agreements with that nation covering entry and operation of personnel, equipment, and supplies, customs conventions, handling of claims, participation of foreign nationals (including host country nationals) etc.

B. Rainfall on Route 17 falls in generally predictable patterns. Field operations which do not depend on the rainfall are scheduled to fall into dry seasons. In Colombia, on Route 25, the rainfall is more of a steady quantity with no such pronounced dry season as that in Panama. The bulk of operations is however planned to coincide with the dry season on Route 17 so as to exploit transportation and supervisory features. The weather in Colombia is expected to be rather a severe constraint.

C. The uncertainty of the achievement of agreements with Panama and Colombia has caused administrative constraints to be imposed on hiring of personnel and buying or renting of some equipment for Routes 17 and 25. This feature, necessary to the safeguarding of Commission appropriations, has provided a slight but distinct delay factor in mobilization for field operations.

5. Existing Data

A. Route 8 - Data are available from previous Nicaraguan Canal Studies, from previous sea-level canal studies (1947, 1960, 1964), and new maps are currently being compiled by the Inter-American Geodetic Survey.

B. Conversion Study - The Panama Canal Company has furnished extensive data on geology, hydrology and hydrography, and information regarding slope stability and failures. Data developed from the previous (1947, 1960, 1964) studies are also available. Excellent maps are available.

C. Modernization of the Lock Canal - Data from previous studies are available. Operational data are being obtained from operating canals in several foreign countries and from the Panama Canal Company.

D. Route 17 - Some data have been obtained from oil companies and other geologic explorations and from previous studies. Data on this remote jungle area are rather scarce. Existing maps are considered good although they do contain inaccuracies.

E. Route 25 - Same as for Route 17, with less existing data available.

STATUS OF STUDY

1. Summary

Considerable progress in the study of engineering feasibility was made during the past year. During the first quarter detailed operations and logistics planning was conducted and coordination was effected with agencies concerned. In the second quarter, effort moved from the planning stage into mobilization and procurement. Funds became available midway through the quarter allowing the recruiting of personnel and the placing of orders for long-term procurement items. During the third quarter personnel recruiting, procurement and the refinement of study objectives and schedules continued. On 15 February 1966, the Government of Panama agreed to permit the surveys on Route 17, subject to details to be agreed upon by a joint United States Panamanian Commission to be formed for that purpose. Based on preliminary arrangements a modest data collection effort was begun on Route 17. Progress in field data collection along Route 17 has been slower than anticipated due to difficulty in acquiring specific real estate access rights and the beginning of the rainy season on 15 April 1966, the third earliest beginning date recorded. Operations will begin on Route 25 immediately following achievement of a survey agreement with Colombia. Data evaluation and engineering studies agencies continued research and compilation of available data and refinement of study plans. Nuclear excavation alinement studies have been prepared, based on the meager data available, and these are being maintained on a quarterly basis incorporating information obtained during each quarter. The engineering studies of the conversion and modernization of the Panama Canal and the hydrology studies for Routes 17 and 25 have progressed through the planning and literature research stages and are now actively underway along Route 17. On 9 March 1966 data collection in the Acoustic Wave Effects Program began with the successful firing of a stratospheric weather rocket from the Canal Zone.

The major problems remaining are the lack of an access agreement with Colombia, the absence of experience data from the regions involved, and the uncertainties of time and funds caused by these items.

2. General

A. The Plan for Study was approved by the Canal Study Commission in September 1965. In general, this plan is being followed with variations being made as local conditions dictate. The largest variation has been in the time-phasing, which was slipped approximately one year.

B. Personnel recruiting has been successful and the participating agencies are essentially staffed for the work to be undertaken. Personnel to work on Route 25 have generally not yet been hired. A number of personnel will be assigned to the field collection effort on temporary duty to conduct specific scientific or technical collection operations.

C. Procurement of equipment, supplies, and services has progress rapidly and a high state of readiness has been achieved for operations on Route 17 and for the support thereof. Similar arrangements for mobilization of the effort for Route 25 have been planned and will be executed.

D. Major problems have been the obtaining of necessary authorizations to conduct operations in Panama and Colombia and the difficulties of conducting operations in the rainy season of the tropics. The former has resulted in delay of the program and virtual loss of the favorable season for construction and field operations in Panama, and has prevented other than reconnaissance-type operations in Colombia. With the delay, and in order to make what progress is possible, some operations are being conducted in the rainy season to obtain experience with associated time and cost figures.

3. Data Collection

A. Current Status - General

(1) Mobilization: Mobilization for data collection has proceeded smoothly. Procurement of equipment and materials has been effected so that long lead-time items are an order, and other supplies are being stored in Canal Zone at no cost. Five LCM-6 vessels were obtained from the Army Material Command and shipped to Panama. They are being used for resupply of the limited field effort this fiscal year. The Office of the Field Director is essentially fully staffed with the exception of some personnel for Route 25. Staffing for AEC management is nearly completed. The Panama Canal Company is providing recruiting, employment, procurement, construction and other services required to support mobilization. The majority of professional

personnel for the initial phases of the data collection program are available. Augmentation by temporary assignment of personnel from United States during peak data collection periods is contemplated, and such personnel are being located. The following subparagraphs are reports of the status of programs which are common to both Routes 17 and 25.

(2) Acoustic Wave Effects: The Acoustic Wave Effects Program became operational, and the first stratospheric weather rocket was fired on 9 March 1966. Subsequent firings have been made at approximately weekly intervals. The firings have been successful, and the data retrieval has been excellent. U. S. Air Force participation in the program is expected to start about 1 August 1966.

(3) Seismic Effects: A revised Seismic Effects Plan, including provisions for data collection, has been prepared and submitted to the Division of Peaceful Nuclear Explosives, AEC, and to the Canal Studies Coordinating Committee for review.

(4) Bioenvironmental Studies: Proposals from contractors have been received in most of the bioenvironmental technical areas. Proposals in marine and estuarine ecology and in human ecology have been approved. Coordination is being affected with the Smithsonian Institution, the Fish and Wildlife Service, the United States Public Health Service, and other agencies concerning the studies. Cooperative arrangements for limited animal collections have been made with medico-ecology personnel.

B. Current Status - By Route - The status of the data collection programs, specifically associated with Routes 17 and 25 follows:

(1) Route 17

a. Topography: To obtain experience factors and cost data, a limited topographic survey effort was started using Panamanian surveyors under the supervision of professional personnel of the Office of the Field Director, OICS. On 1 April 1966, a contract was awarded to INCASA, A Panamanian engineering firm, and field work began on 12 April 1966. Work to date has been good quality and the costs compare quite favorably with previous experience and with estimates. A good start has been made on the third-order base line from the Pacific terminus continuing north of Santa Fe. Rainy weather has not seriously affected the surveying work but has caused some problems in supporting the field problems. As soon as support is available on the Atlantic side, a base line party will begin work from the vicinity of Punta Sasardi toward the Continental Divide.

b. Geology: Prior to an access agreement, photo-geology work was completed and indications of structures marked on maps and photographs. In February 1966, surface mapping began using OICS staff geologists augmented by geologists on temporary assignment. Geological work was carried on in the vicinity of the Sabana River, and reconnaissance-type mapping was extended farther afield. At the end of the fiscal year about 20% of the area to be mapped has been covered, but testing of samples remains to be done, as well as geologic profiling, interpretation of test results and field work, and report preparation. Samples have been dispatched for paleontological and petrographic analyses to laboratories in the United States.

c. Hydrology: Reconnaissance for locations for rain, stream and tide-gage stations is under way. Reconnaissance of a major portion of Route 17 was delayed pending agreement with the local Indian tribe, which was reached on 25 May 1966. Helicopter service has been obtained and will expedite the final reconnaissance for the remaining stations. A tide-gage station near the Pacific terminus, a rain-gage station, and combination river and rain gage on the upper Sabana River are operational.

d. Medico-Ecology: A temporary dispensary is in operation at Santa Fe, and a first-aid station is provided near the weather station at Pidiaque at the Pacific terminus of Route 17.

e. Advance Party Construction: Temporary operating camps have been provided pending construction of the project-life base camp. A centerline trail is being constructed on or near the surveyed base line. This trail has approached to within three miles of the Chucunaque River. In order to effectively operate in the wet season, several temporary camps will be constructed along the base line to support personnel working in the area. These camps will permit operations to continue during and after heavy rains, which otherwise would prevent daily resupply.

f. General Support: Prefabricated camp units have been set up for base camps and meteorology stations. Motor vehicles have been received and are in service. Prefabricated units for hydrology gage houses are on hand and are being erected. A radio net has been established to link the field operations with the base camp and with the Canal Zone office. A repeater station for jungle transmission have been established on Pidiaque Mountain.

(2) Route 25

a. Mobilization: Mobilization of supplies, equipment and personnel is proceeding in the same manner described for Route 17. Hiring of personnel to work on Route 25 is being deferred pending a satisfactory survey agreement with Columbia.

b. Collection Programs: Data collection has been largely limited to map studies, literature research, and reconnaissance. Photo-geology work for the route is complete.

C. Problems

(1) Real Estate: Progress was impeded due to the delay in acquiring necessary real estate access rights. Efforts on the Atlantic side of Route 17, as well as in the Chucunaque River valley region, were delayed because of prolonged negotiations with the Government of Panama and three Indian groups which inhabit these areas. On 25 May 1966, agreements were reached giving authority for OICS to operate freely across the Isthmus within the eight mile-wide zone of interest.

(2) Rainy Season: The advent of the rainy season on 15 April 1966, the third earliest date on record, has also retarded progress. Existing logging roads are not plotted and are impassable during the wet season. Construction of facilities during the rainy season poses logistics problems and increases costs.

4. Data Evaluation

A. Preliminary alinement studies have been prepared for Routes 17 and 25 based on those data which were available at the beginning of the canal studies program. These alinement studies have been revised each quarter to incorporate data collected in the interim.

B. Existing data have been collected, compiled, and are now being analyzed, and detailed plans for study have been prepared for the conversion routes. There are five routes being considered and efforts are being made to develop camparable studies of the engineering feasibility of each. Available data will be studied together with current and projected construction (excavation) systems and canal operations systems to determine the most feasible route and to develop cost estimates for construction and operation.

C. Data have been collected and detailed plans for study also developed for the flood control and conventional supporting construction studies on Routes 17 and 25 and for the evacuation studies for those routes. These studies support the nuclear excavation design studies and are coordinated with the operational studies. The tentative design of the channel prism for a sea-level canal has been established in the range of from 600' x 60' to 800' x 70'. The angularity of turns and desirable length of reaches (tangents) are being investigated in conjunction with ship maneuverability characteristics and predicted tide-induced currents.

D. The working groups have essentially been formed for supervision of the data evaluation and operational studies. Detailed plans for study and selection of agencies to conduct field work are continuing. Preliminary activities have been conducted to identify specific objectives and to study available data. These preliminary studies will be continued and updated as data from the field become available.

5. Other Matters of Note

The Board of Technical Associates for Geology, Slope Stability and Foundations met in December 1965 to review the geology program as outlined in the Plan for Study. They found the program to be generally satisfactory but noted a number of exceptions. Their findings were reviewed carefully and such actions as were possible were taken in accordance with those findings. In March 1966 the geologist members of the Board visited the Canal Zone, Routes 17 and 25, and the available geologic data on these areas were presented to them for consideration in evaluating the plans for investigation of the geology. Their findings indicated general satisfaction with the plans with minor exceptions. Steps have been taken to revise the plans accordingly. In June 1966 the Board met to consider the data available for the conversion study and the plans for conducting the study. Their findings reflected satisfaction that the available data and the study plans are generally adequate to prepare feasibility studies on the conversion routes being considered. The several suggestions made at the meeting are now under consideration by the agency conducting the conversion studies.

6. Significant Activities Planned for FY 1967

A. Route 17 - A full data collection effort in all programs is planned for FY 1967. Operation of weather stations will begin on about 1 July 1966 and construction of hydrology stations will continue, with each station starting operation as soon as completed. Collection of bioenvironmental and medico-ecology data will begin as soon as possible, with the geology effort continuing on a limited basis until the dry season (about December 1966), when a full-scale effort will be fielded. The topography program, now operating on a limited scale, will continue and expand operations.

B. Route 25 - Construction of meteorological and hydrological stations and facilities for general support will start early in FY 1967.Bioenvironmental and medico-ecology data collection will begin at as early a date as possible, as will the topographic survey of the route. Geologic reconnaissance may begin in the late summer or early fall, with the full geology effort beginning in about December 1966.

C. Common Items - Acoustic wave data collection will continue through weekly rocket firings from the Canal Zone. In addition, the U. S. Air Force is scheduled to join in this cooperative program and provide additional rockets for obtaining data which cannot now be collected.

D. Data evaluation, operational and engineering studies will continue, using as appropriate the data collected by field programs. Those studies not dependent on field data, such as the conversion studies, are scheduled to make significant progress toward a final product during FY 1967.

RELATIONSHIP OF THE RESEARCH AND DEVELOPMENT PROGRAM TO THE CANAL STUDIES

1. Purpose

The experimental nuclear excavation research portion of the Plowshare Program constitutes important input to the Interoceanic Canal Studies. Evaluation of the feasibility and cost of using nuclear explosives for excavation of a sea-level canal requires nuclear cratering experiments to advance the nuclear cratering technology and to provide a better basis for the assessment of the engineering aspects of using nuclear explosives for excavation.

2. Status

A. The Isthmian Canal Studies 1964, prepared by the Corps of Engineers, the Atomic Energy Commission, and the Panama Canal Company, identified the following major uncertainties in the excavation of an Isthmian sea-level canal by nuclear explosions: (1) "the uncertainty about our ability to blast the section of a channel through the highest elevation of the Continental Divide with a single nuclear detonation of safe yield;" and, (2) "the uncertainty about the stability of the relatively steep slopes resulting from the nuclear detonation."

B. Since the preparation of the 1964 Isthmian Canal Studies, there has been one low yield nuclear cratering experiment.

Consequently, we are still faced with the problems of applying data gained in the dissimilar geological conditions and dry environment of the Nevada Test Site to the tropical environment of the Isthmus, assessing stability of nuclear craters based on relatively small cuts in a few media, and planning individual row charges and connection of row charges without the benefit of a nuclear row cratering experiment. Progress can be made by theoretical analyses, model studies, and large-yield high-explosive experiments. However, only nuclear craters provide an opportunity to study potential stability and construction problems of the unprecedented size involved in the construction of a nuclear excavated sea-level canal.

3. Requirements

A minimum program of experiments to satisfactorily answer the uncertainties outlined above would include an experiment of large yield specifically designed to provide an assessment of slope stability, and experiments with nuclear row charges and connecting charges in varying terrain.

Organization for Study of Engineering Feasibility

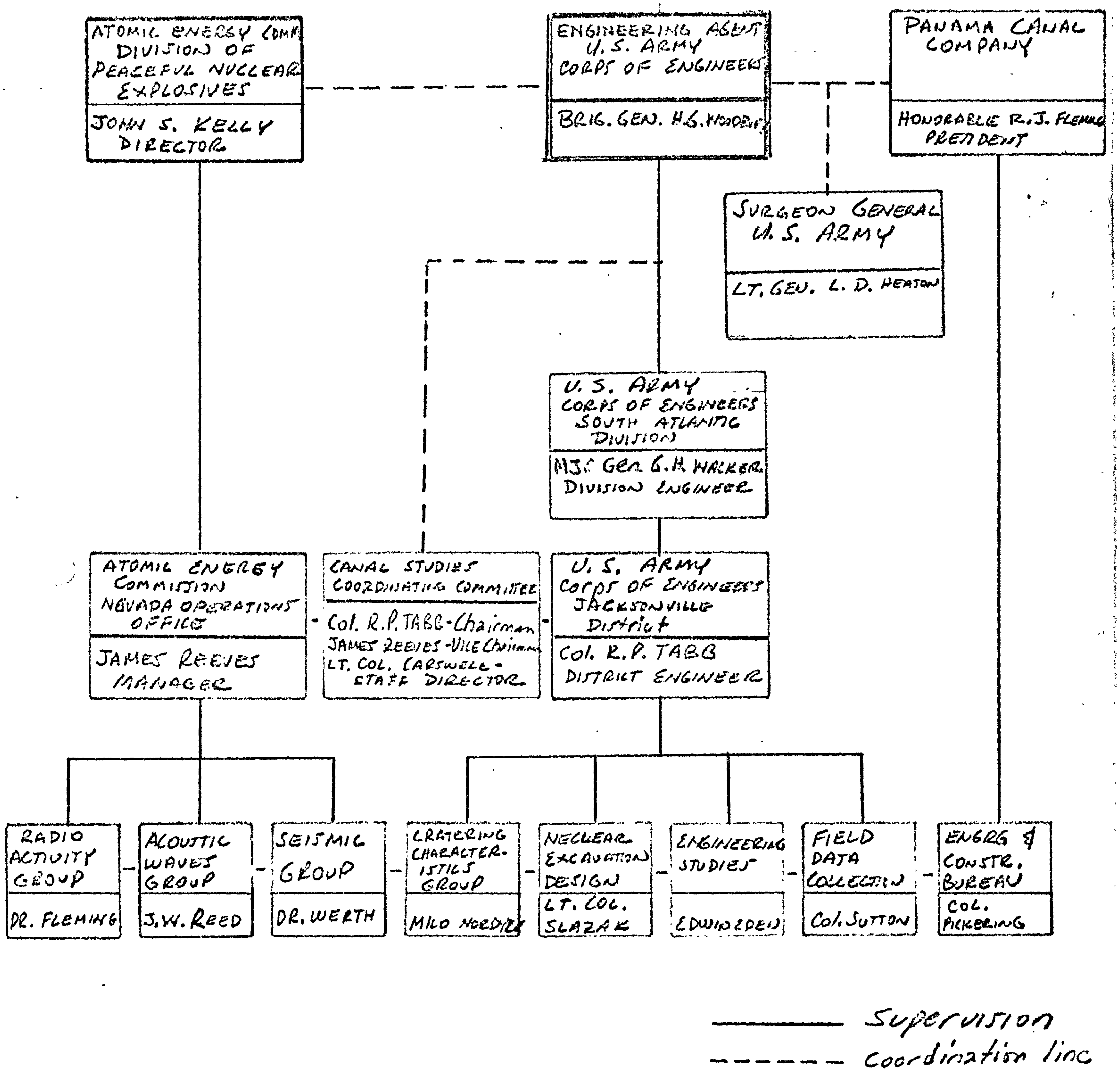


Figure 8-1

APPENDIX 9

BUDGET AND FINANCIAL PROGRAM FOR INTEROCEANIC CANAL STUDY

BACKGROUND

At the time Public Law 88-609 became law on 22 September 1964, it was expected that site surveys in Panama and Colombia would begin no later than January 1965, and that rights for these surveys would be incorporated in treaties giving the United States the necessary authority for the construction and operation of a sea-level canal. These assumptions were used in developing the $17.5 million estimate for the total study cost and in establishing the 30 June 1968 date for submittal of the full and complete report. Both of these figures appear in the present Public Law. Contrary to our expectations, the surveys did not begin in January 1965 because (1) we did not have a treaty with either Panama or Colombia and (2) the Commission was not appointed until after the 1965 dry season. These factors, in effect, caused the loss of one year's time.

Soon after the Commission was appointed, a reprogramming of the study was made in an effort to compensate for the loss of the FY 1965 dry season. The constraints imposed upon this effort were the reporting date of 30 June 1968, and the appropriation ceiling of $17.5 million. In spite of the fact that one year of study time had been lost, these values were not challenged at the time since the Commission did not have a detailed plan for study or actual on-the-ground experience on which to base a more accurate time and cost estimated. The new program assumed the start of full-scale data collection beginning in January 1966, which formed the basis for preparation of a detailed plan for study of engineering feasibility and for the development of the FY 1965, FY 1966 and FY 1967 budgets. Subsequent events have seriously altered the original program and have effected both time and cost estimates. A summary of Financial Data is tabulated in Figure 9-1.

BUDGETING

1. FY 1966

The amount of $7.5 million was requested to continue the Interoceanic Canal Study through Fiscal Year 1966. As previously mentioned, the cost estimate that made up the FY 1966 budget was based on the assumption that full-scale data collection would begin during the 1966 dry season along both the Panamanian and Colombian routes. However, it became apparent by September 1965 that the treaties would not be negotiated and ratified by the advent of the 1966 dry season. The Commission, therefore, decided to request the Department of State to negotiate Executive Agreements with Panama and Colombia for site surveys only, with the understanding that sea-level canal treaties would follow. This decision was made in the hope that the site survey agreements could be completed quickly while the treaty negotiations continued, but it was obvious that the agreements could not be obtained in sufficient time to prevent a delay in the planned FY 1966 program. Therefore, the appropriation request for FY 1966 was adjusted downward to $7 million.

2. FY 1967

The amount of $6.5 million was requested to continue the study through Fiscal Year 1967. This request was based on the same assumption used for the original FY 1966 request, that is, that full-scale data collection would begin in the 1966 dry season along both study routes. The FY 1967 budget was not altered at the same time the FY 1966 program was changed since too many uncertainties existed on which to base a firm estimate. The actual appropriation in FY 1967 may be less than the $6.5 million, provided the unexpended balances of FY 1965 and FY 1966 are combined with the FY 1967 appropriation.

APPROPRIATIONS

1. FY 1965

An appropriation of $400,000 was made by the Congress in FY 1965 to organize the Commission and to develop the Plan for Study.

2. FY 1966

An appropriation of $7 million was made by the Congress in FY 1966. These funds were appropriated for continuation of the study based on the following assumptions:

a. Data collection activities to begin in Panama in November 1965.

b. Equipment for the Colombian survey to be purchased in 2nd quarter of FY 1966.

c. Meteorology studies to begin along the Colombian route in the 3rd quarter of FY 1966.

d. Other data collection along the Colombian route to begin in the 4th quarter of FY 1966.

Due to the status of the treaty negotiations the actual beginning of on-site work in Panama was delayed until after 15 February 1966.

3. FY 1967

To carry out its work in Fiscal Year 1967, the Commission has requested $6.5 million. This $6.5 million will be made up of approximately $4.4 million in new appropriations plus the $2.1 million which was unexpended in FY 1965 and FY 1966.

PROGRAMMING

1. FY 1966

Discussions initiated with Panama in October 1965 for a site survey agreement were successfully concluded in an exchange of notes on 15 February 1966. Discussions with Colombia were initiated in early February 1966, and concluded on 1966. Although on-site access has been achieved, the delays in obtaining these access agreements have seriously affected the FY 66 program by denying access to the routes until the conclusion of the 1966 dry season. During the negotiation period, every advantage has been taken to expedite those functions which do not require actual route access; however, full-scale data collection has been postponed until January 1967. As a result, the obligations during FY 1966 were approximately $5 million. This leaves an unobligated balance on 30 June 1966 of about $2 million of the $7 million appropriated.

2. FY 1967 and Beyond

The program outlined for FY 1967 will require expenditures of about $6.5 million. The expenditures for the remainder of the program are as yet undefined.

FINANCIAL SUMMARY

Obligations and Expenditures Thru 30 June 1966
($ in Thousands)

Program	FY 1965			FY 1966		
	Obligations	Expenditures	Unobligated Balance	Obligations	Expenditures	Unobligated Balance
1. Commission Support, Technical Advisors, Special Studies, and Engrg. Agent Support						
2. Data Collection						
3. Data Evaluation						
TOTAL						

ATLANTIC-PACIFIC INTEROCEANIC CANAL STUDY COMMISSION - FINANCIAL DATA
($ in thousands)

	Total Estimated Cost Based on 30 June 1968 Report Date	Appropriated FY 1965	Appropriated FY 1966	Appropriation Requested FY 1967
1. Commission Support & Others	$ 1,513	$118	$ 460	$ 515
2. Data Collection				
a. Topography	716		716	
b. Geology	1,813		473	1,174
c. Hydrography	100		8	92
d. Hydrology	831		298	286
e. Meteorology	3,174	10	1,718	896
f. Acoustic Waves Effects	234	5	122	81
g. Seismic Effects	113	5	43	60
h. Terrestrial Bioenvironmental	926	55	256	393
i. Marine Bioenvironmental	1,140	50	280	536
j. Medico-Ecology	268		89	116
k. Management & General Support				
(1) OICS	2,943	93	1,498	960
(2) AEC	412	35	181	129
Sub-Total	12,670	253	5,682	4,723
3. Data Evaluation				
a. Nuclear Excavation	125	13	28	41
b. Operation Studies				
(1) Radioactivity	1,257		347	368
(2) Acoustic Waves	66		20	31
(3) Seismic	141		14	49
(4) AEC Coordination	598		150	201
c. Engineering Studies	1,130	16	299	572
Sub-Total	3,317	29	858	1,262
TOTAL	$17,500	$400	$7,000	$6,500

Figure 9-1

APPENDIX 10

LEGISLATIVE REQUIREMENTS FOR INTEROCEANIC CANAL STUDY

AUTHORIZING LEGISLATION

1. Public Law 88-609

The Atlantic-Pacific Interoceanic Canal Study was authorized by Public Law 88-609 to make a full and complete investigation and study, including necessary on-site surveys, and considering national defense, foreign relations, intercoastal shipping, interoceanic shipping, and such other matters as they may determine to be important for the purpose of determining the feasibility of, and the most suitable site for, the construction of a sea-level canal connecting the Atlantic and Pacific Oceans; the best means of constructing such a canal, whether by conventional or nuclear excavation, and the estimated cost thereof.

2. Amendment to Authorizing Legislation

An Act amending Sections 2 and 4 of Public Law 88-609 was passed by Congress and signed by the President on ______ June 1966. This act amended the authorizing legislation to make funds appropriated for the study to be available until expended, to allow the Commission to pay experts and consultants at a per diem rate of $100 and to authorize the Commissioners to be paid at a per diem rate, when actually employed, of $100.

LEGISLATIVE REQUIREMENTS

1. Future Amendments to Public Law 88-609

Public Law 88-609, which became law in September 1964, assumed that site surveys would begin no later than January 1965. This assumption resulted in a statuatory appropriation ceiling of $17.5 million and a reporting date of 30 June 1968. Difficulties encountered in starting actual on-site surveys have adversely affected the study completion date. This extension will result in an increase in study cost. The final figures are dependent upon several items, including on-site access along the Colombian Route, weather, availability of equipment, political factors in host countries, etc., and can only be evaluated after more experience is obtained of the study from actual on-site work. It thus appears that an amendment to the authorizing legislation will be required to enable the Commission to satisfactorily complete its work.

2. Timing of Future Amendments.

Data collection has begun along the Panamanian Route. This effort has been limited to some extent because of inclement weather. However, full-scale data collection along both the Panamanian and Colombian Routes is expected to begin prior to 1 January 1967, which is the beginning of the dry season in the area. The experience gained in this effort will be used to adjust the completion date and to develop revised cost estimates.

It is anticipated that by early in calendar year 1967 the Commission will have obtained sufficient experience to recommend changes to the authorizing legislation regarding a new reporting date and funding requirements.

APPENDIX 11

SURVEY AGREEMENTS

AGREEMENT WITH PANAMA

Discussions were initiated with Panama in October 1965 and were successfully concluded in an exchange of notes between Ambassador Adair and Foreign Minister Eleta on 15 February 1966. These notes provided that the Government of the United States might engage in exploration and on-site surveys as part of a series of studies to determine the desirability and feasibility of constructing a new canal at some other location within the territory of the Republic of Panama. Conditions included the participation of Panamanian officials in the explorations and providing, when available, data and conclusions derived from the surveys to the Republic of Panama.

Other provisions were:

A. United States personnel, equipment, and supplies will be permitted to enter freely, move within, and leave the Republic of Panama as necessary.

B. The Government of Panama will provide, free of cost to the United States, the use of all public lands.

C. Costs of the surveys are to be borne by the United States, to include access rights to private lands.

D. Colonel Alex G. Sutton, U. S. Army Corps of Engineers, and Dr. Simon Quiros, Panamanian Minister of Public Works, will represent their respective governments in arriving at the detailed arrangements necessary to implement the basic agreements.

E. The agreements, as written, terminated 30 June 1969, and may be extended by mutual consent.

AGREEMENT WITH COLOMBIA

Negotiations with Colombia were initiated in February 1966. The Commission was notified on ____________ that satisfactory agreement had been obtained and that arrangements for official signing were being prepared.

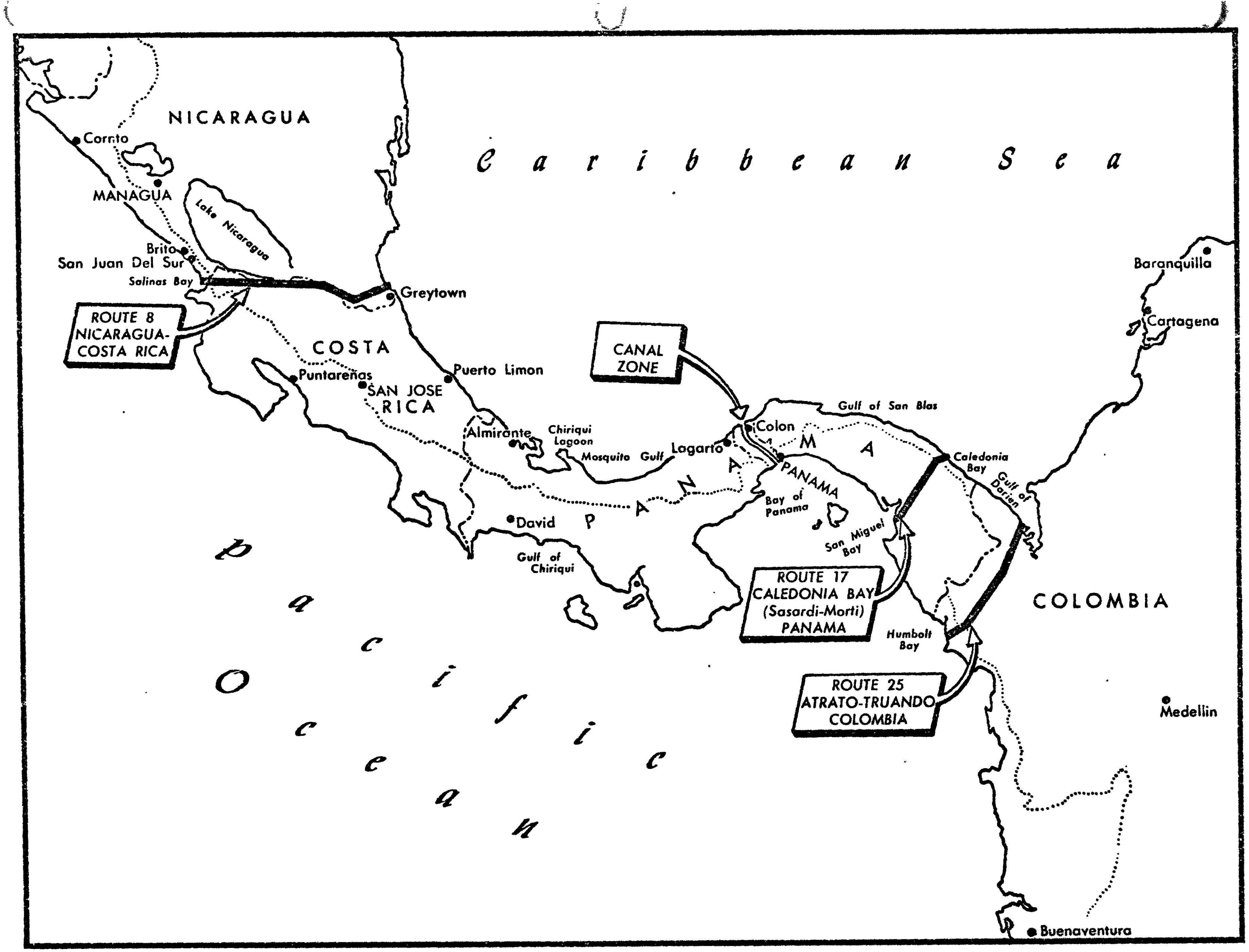
The agreement with Colombia contains essentially the same provisions as those in the notes with Panama. A significant change provides that access to all necessary real estate, public and private, will be provided without cost to the United States.

IMPLEMENTATION

In accordance with the terms of agreement with both countries, an American and local official are to be appointed to carry out the detailed arrangements. These include local participation, exchange of data, access to specific real estate, the processing of claims, and movement of personnel, supplies, and equipment.

These arrangements are being made in Panama by means of a series of letters exchanged between the two representatives. Complicating factors to date have included the difficulty of determining land ownerships, administrative processing time, and the task of securing the cooperation of native Indian tribes. These problems are being resolved with a high degree of cooperation being shown by the various Panamanian officials.

Initiation of detailed arrangements with Colombia will begin immediately following the official exchange of notes.



MAP OF CANAL ROUTES